ISTITUTO UNIVERSITARIO NAVALE

FACOLTÀ DI ECONOMIA

ISTITUTO DI STUDI ECONOMICI

# INEQUALITY, GROWTH AND MACROECONOMIC POLICY: CAN SOMETHING BE LEARNED FROM THE EMPIRICAL ASSESSMENT OF THE RELATIONSHIPS?

RAUL DE LUZENBERGER

WORKING PAPER N. 10. 2000

JULY 2000

Redazione:
Istituto di Studi Economici
Facoltà di Economia
Istituto Universitario Navale
Via Medina, 40
80132 Napoli
Tel. +39-081-5512207–5510738 – fax +39-081-5511140

La Redazione ottempera agli obblighi previsti dall'Art. 1 del D.L.L. 31.8.1945, n. 660.

Copie della presente pubblicazione possono essere richieste alla segreteria dell'Istituto.

ISTITUTO UNIVERSITARIO NAVALE
ISTITUTO DI STUDI ECONOMICI

Working Paper n. 10.2000

July 2000

# INEQUALITY, GROWTH AND MACROECONOMIC POLICY: CAN SOMETHING BE LEARNED FROM THE EMPIRICAL ASSESSMENT OF THE RELATIONSHIPS?

RAUL DE LUZENBERGER *

* Università di Cassino.

## *Table of contents*

## 1. *Introduction*

A long-standing debate in economics concerns the distribution of the benefits of economic growth. Recent publications made available new world wide data sets on macroeconomic variables and income distribution[1], and contributed to shed new light into the issue. They also contributed to the empirical assessment of the impact of macro-stabilisation policies on inequality. These policies help develop a stable framework for economic growth, but may have a significant positive effect on inequality and foster cases of "immiserising growth".

An influential view, originally put forward by Kuznets (1955), claims that inequality will increase in the early stages of growth and subsequently revert towards lower levels (usually higher than the original one). This is the famous inverted U relationship between inequality and average income (at various stages of development) associated with Kuznets' hypothesis.

Current research on the Kuznets' Hypothesis draws heavily on the literature on the political/economic models, on credit constrains and credit market imperfections, and on endogenous growth models. Progress has undoubtedly been made in understanding the links between inequality and growth. Yet, "*although attention has focused on both political and economic explanations for such a relationship, the underlying processes are still imperfectly understood.*[2]"

A partial review of recent literature reveals that higher growth rates have a negative effect on inequality (Sarel 1997), or tend to be associated with greater inequality (Ravallion and Chen 1997), or, finally, have no systematic link with inequality (Deininger e Squire 1997). In a similar fashion, tests of the Kuznets' hypothesis find evidence of a positive effect of higher income on equality (Sarel 1997 and Ravallion and Chen 1997), or reject the existence of a Kuznets' process (Anand and Kanbur 1993).

The impact of macroeconomic policy is also imperfectly understood. Sarel (1997) finds no effects of inflation (level, variability and the rate of change) on income distribution, and a negative effect of investment rates on inequality. Bulir (1998) finds a positive non-linear effect of inflation, and Vanhout (1997) a positive effect of investments (both in physical capital and to a lesser extent in human capital) on inequality.

Most of the recent works make use of the same or comparable data sets. There are, however, two relevant summary measures widely used in the literature, *Poverty* and *Inequality*, and many ways of assessing both. In addition, the literature often supplements them with information from the quintile distribution (Deininger and Squire 1996) or combines them in an effort to improve on the ability of summary measures to describe underlying patterns (Woodon 1999).

Econometrics methods also vary widely from simple OLS (Ravallion and Chen 1997[3]), to long run regression (Sarel 1997) and to more complex panel data models (Islam 1995,

[1] Summer - Heston (1995) and Deininger - Squire (1996).

[2] Deininger - Squire (1996).

[3] They correct standard errors for the theoretical structure of cross correlations (if their hypothesys are correct) and for heteroschedasticity.

Lee Pesaran and Smith 1998, Woodon 1999). Logs and levels, and sometimes more complex non-linear structural forms, have all been employed.

Results from all these analytical efforts and empirical research are somewhat disappointing. Part of the responsibility may lie in the limits of available international data sets. There are two countries, however, for which long series of reasonably accurate data are available both for inequality and for macroeconomic variables (USA and India).

Part of the responsibility may also lie in the difficulty associated with interpreting measures of inequality. Robison (1976) is the first to note that the inverted U can result from a number of theoretical models and/or growth profiles. In this work the argument is extended by presenting cases in which increases of measured inequality are caused by factors that can hardly be associated with increases of actual inequality among economic agents.

In this paper I will also argue that the use of the Gini index in many empirical applications is partly responsible for the current confusion. The Gini index is a summary measure obtained by aggregating information about inequality from the different sections of the Lorentz' curve. A first, well-known defect is that the Gini coefficient may not accurately reflect changes in the welfare of individual groups in a population when Lorenz curves intersect. A second, linked to the previous one, is that empirically it moves too little in response to changes in income distribution.

For example Li, Squire and Zou (1998) note that the Gini coefficient in India was almost constant from 1951 until 1992, with a mean value of 32.6 and a standard deviation of 2.0. They also note that in a pool of Gini indexes from different countries about 90% of the variation can be explained by cross country variation and only 10% by within country variation across time.

Similarly, Deininger and Squire (1996) find that: "The main reason for this lack of relationship appears to be that, whether average incomes are increasing or declining, changes in the Gini coefficient of inequality tend to be small." And go on to note that: "changes in the absolute income received by different quintiles reveal additional information that is not captured in our aggregate measure of inequality"[4]. They attribute the lack of movement in the Gini coefficient to intersecting Lorenz curves[5].

This empirically observed stability of inequality measures is the more surprising, as it is easy to develop theoretical models that imply large movements of the aggregate measures of inequality. An explanation could simply be strong inertia in the distribution. This may reflect a complex dynamic structure of the relationship among growth, inequality, macroeconomic variables and policy. The political-economic literature on growth emphasises the importance of past inequality to explain the growth performance of different countries. If the "inequality to growth" effect is combined with the "growth to

[4] "In particular, although we do not find significant correlation between aggregate growth and changes in inequality, there is a strong correlation between aggregate growth and changes in the income of all quintiles except the top one." (Deininger and Squire 1996).

[5] "Our data suggests that intersecting Lorenz curves are indeed observed in most cases. This observation would imply that, within countries, there may be considerable changes in the income shares received by individual quintile groups of the population, despite the apparent stability of the Gini coefficient". Cfr. Deininger and Squire (1996).

inequality" effect, the resulting all encompassing model has a complex dynamic structure that could explain the smooth behaviour of the Gini index.

In addition, the Gini index, a summary measure that aggregates information across sections of the population, may give rise to the same econometric problems extensively reviewed in Pesaran and Smith (1995). I will also argue that it gives rise to inefficient estimates because it does not make use of all implied restrictions, implicitly estimating a redundant equation. Thus, estimating models of inequality using the Gini coefficient yields inefficient estimates of the parameters (in the sense that they have higher variances) and biases (for two different reasons) all tests towards the acceptance of the null hypothesis of no-significance.

In conclusion, there are both theoretical and empirical arguments to question the relevance of the Gini coefficient for this type of analysis.

The plan of the paper is as follows: section 2 reviews the basic theoretic models and discuss issues on structural form; section 3 discusses the biases induced by using the Gini index, section 4 discusses other econometric issues and simulations and applications. Section 5 draws tentative conclusions.

## 2. *Theoretical issues*

### *Growth and Inequality*

To justify his famous inverted U relationship Kuznets (1955) sketched the following argument: assume that the economy is divided into a rural and urban sector. The rural sector is poorer (on average) and more egalitarian, while the urban sector has a higher mean income, but also greater inequality. Growth occurs when people shift from the rural sector to the urban one.

To formalise the argument, assume that there are 2 sectors (i=1,2) with a given cumulative income distribution $F_i$ and income density function $f_i$. Assume further that the fraction of the population in sector 1, the advanced or urban sector, is equal to $q_t$.

The cumulative income distribution and density function are given by:

1) $$F(y_t, x_{1,t}, x_{2,t}, q_t) = q_t F_1(y_t, x_{1,t}, q_t) + (1-q_t) F_2(y_t, x_{2,t}, q_t)$$

2) $$f(y_t, x_{1,t}, x_{2,t}, q_t) = q_t f_1(y_t, x_{1,t}, q_t) + (1-q_t) f_2(y_t, x_{2,t}, q_t)$$

$$y_t \in Y_t$$

where $y_t$ is income and $x_{i,t}$ is a vector of exogenous variables at time t[6]. This general definition allows for non-constant sectors distributions and for time varying ratios of the mean income in the two sectors. The Kuznets' hypothesis is that the overall distribution of

[6] Without loss of generality it is possible to assign the same domain $Y_t$, $Y_t \equiv Y_{1,t} \cup Y_{2,t}$, to income in both sectors, by simply assigning zero frequency to the sets outside the domain of each distributions.

income $F$ becomes more unequal in the first stages of economic development and subsequently reverts to previous levels. Economic development is viewed unambiguously as both an increase in the share of population accruing to the innovative sector and as an increase in the mean income of the whole population.

Given (1) and (2) a shift of workers (families) from one sector to the other results in a change in distribution given by:

$$3) \qquad \frac{\partial F(y_t, x_{1,t}, x_{2,t}, q_t)}{\partial q_t} = F_1(y_t, x_{1,t}, q_t) - F_2(y_t, x_{2,t}, q_t) + \left[ q_t \frac{\partial F_1}{\partial q_t} + (1-q_t)\frac{\partial F_2}{\partial q_t} \right]$$

To simplify the argument, it is normally assumed that a representative slice of the rural distribution is transformed into a representative slice of the urban distribution. Thus (by assumption), sectors distributions remain unchanged and the term in square brackets in (3) is equal to zero. The importance of (3) lies in the facts that mean income is equal to[7]:

$$4) \qquad \mu = \int_Y [1 - F(y,\ldots)]\, dy$$

and a negative derivative in (3) for all y's implies an increase in $\mu$. Since the distribution of income is now spread on a larger domain, it also implies a (weak) increase in inequality. Given Kuznets' hypotheses, when the first labour unit moves to the urban sector at the beginning of growth inequality increases. This can be seen by solving (3) for $q_t=0$. When the last labour unit moves to the urban sector, ($q_t$ approaches one) the system reaches the new steady state, and inequality may be falling[8].

Under Kuznets' assumptions the derivative in (3) is negative semi-definite when:

$$5) \qquad F_1(y_t, x_{1,t}, q_t) \leq F_2(y_t, x_{2,t}, q_t)$$

[7] Cfr. Appendix and, e.g., Lambert (1993).

[8] If in fact it is falling, at some points between the two extremes of the growth process there must be a turning point in the relationship between inequality and average income. Anand e Kanbur (1993) show under which conditions such a turning point exists (for different measures of inequality), and that the inverted U relationship may or may not emerge. These conditions require that inequality between sectors (among mean income in the two sectors) is large enough compared with inequality within the two sectors and, in particular, within the high inequality urban sector. When inequality is measured by the Gini index and sectorial distributions are non-overlapping, the condition turns out to be:

$$\frac{\mu_1}{\mu_2} \geq \frac{(1+G_1)}{(1-G_1)}$$

where $\mu_1$ is the mean income of the urban sector and $\mu_2$ is the mean income of the agriculture sector, and $G_1$ is the Gini index of the urban sector.

holds for every y[9]. If this property holds, distribution 1 is said to "dominate" distribution 2. Distribution dominance cannot be expected in general as multiple crossings between the cumulative distribution functions are the norm.

The assumptions of the Kuznet's process can also be used to derive a Lorentz curve for the overall population, from the distribution of the two sectors. This is given by:

$$6)\qquad L(p)=\frac{1}{q_t\mu_1+(1-q_t)\mu_2}\int_{y_{\min}}^{y(p)} y\left[q_t f_1(y,x_{1,t},q_t)+(1-q_t)f_2(y,x_{2,t},q_t)\right]dy$$

We are interested in the behaviour of the Lorenz' curve as population shifts from the traditional sector to the advanced one (as $q_t$ increases). In a recent work Anand e Kanbur (1993) show that the Lorenz curve at the beginning of economic development (when $q_t$ is 0) is weakly dominated by the old Lorenz' curve, while at the end of the economic process the result is ambiguous.

The Gini index, one of the most famous and widely used summary measures of inequality, is derived directly the Lorenz curve:

$$7)\qquad G(q)=1-2\int_0^1 L(p)dp=-1+\frac{2}{\mu}\int_{y_m}^{y^M} zf(z)F(z)dz$$

The inverted U relationship is often cast in terms of Gini coefficient. From Anand and Kanbur result, follows that it does not always hold. When it does not hold, inequality weakly increases along all the phases of economic development.

There is, however, a case in which the inverted U relationship always holds, which is particularly interesting for its implications. This is the case in which the within sectors distributions of income are the same, besides a proportional re-basement. The distribution of urban incomes is equal to that of agriculture incomes multiplied by a constant factor greater than one. It is easy to prove that the re-basement lives the Gini index unchanged[10].

*Does growth increase social distress? A Pareto superior change that increases measured inequality.*

In example (A) is reported a simple example of proportional growth in which income is distributed according to Pareto distributions. The distribution of income in the advance sector is simply a scaled up replica of the distribution in the traditional sector. Assume that as a representative share of the population moves from the traditional sector to the advanced one. Everyone finds that his/her income is increased by a factor k greater than

[9] This also implies, given (4), that $\mu_1 \geq \mu_2$.

[10] The proof is standard. See Lambert (1993) for details.

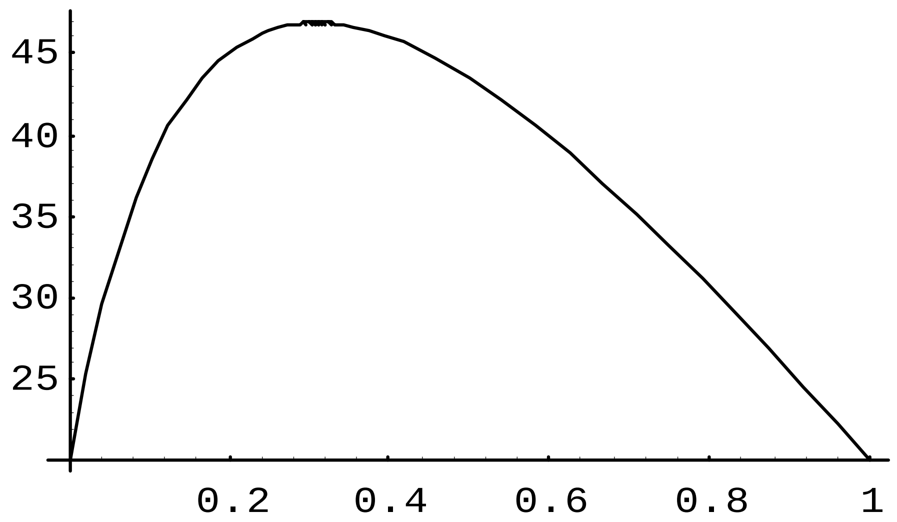
one after moving between sectors. Kuznets' hypotheses are still satisfied, but the migration between sectors gives rise to a (strictly) Pareto superior distribution of income.

In this case, however, the reverse U hypothesis strictly holds. As q (the share of population accruing to the advance sector) increases starting from 0 the Gini index also increases signalling higher inequality even if every one is now better off.

Chart 1 is derived by example (A) for some values of the parameters of the Pareto distribution that are within the range of possibility. In the chart the Gini index increases more than two folds by 20 percentage points as q increases. But the increase in inequality is simply a statistical feature in this case that comes from the fact that the two distributions of income that characterise two separate and well defined groups within population are grouped together. It is not difficult to construct similar examples. The example given suffice to illustrate the point.

**Chart 1**

**Inverted U with Gini Index**
**Effect of a shift of the population from the poorer to the richer sector**




**Legend:** Inequality in the two sectors is the same (Gini = 20%). The population shifts from the poorer sector to the richer one. Mean income in the poor sector is one fifth of that of the rich **sector.**

*Does perfectly anticipated inflation increase inequality? And does it matter?*

Most of the literature concerned with the effects of inflation on the distribution of income points to the relevance of unanticipated inflation and/or of inflation volatility as a measure of surprise inflation. Anticipated inflation is, in general, thought to be neutral if enough instruments are there to edge against anticipated inflation. In general, the effects of anticipated effect will depend on the institutional context. One question is whether anticipated inflation has any impact on average, a second, partly related one, is whether it has any distribution effect. Whether there are margin and price controls, whether the home currency can freely be converted into foreign currency determine very often the final distribution impact of perfectly anticipated inflation.

In this section I will argue that with staggered contracts perfectly anticipated inflation apparently increases inequality and the Gini index. The increase in inequality is, however, only a statistical feature that comes from the fact that in the index current and not permanent income is considered.

Suppose that contracts are set for two periods with a wage fixed in nominal terms. Each period half of the work force renew their contract. Inflation is constant at a rate $\pi$ known to everyone. In setting the contract workers have in mind their individual "constant" real wage $w_i$, which they would receive in any period if annual re-contracting were allowed. Individual incomes are distributed according to a Pareto Distribution. Finally, assume that any saving can be invested at a fixed constant real rate r. In this case the wage of the $i^{th}$ individual is set according to the rule:

8) $$\frac{W_1}{P} = \left(1 + \frac{\pi}{1 + (1+\pi)\cdot(1+r)}\right) w_i$$

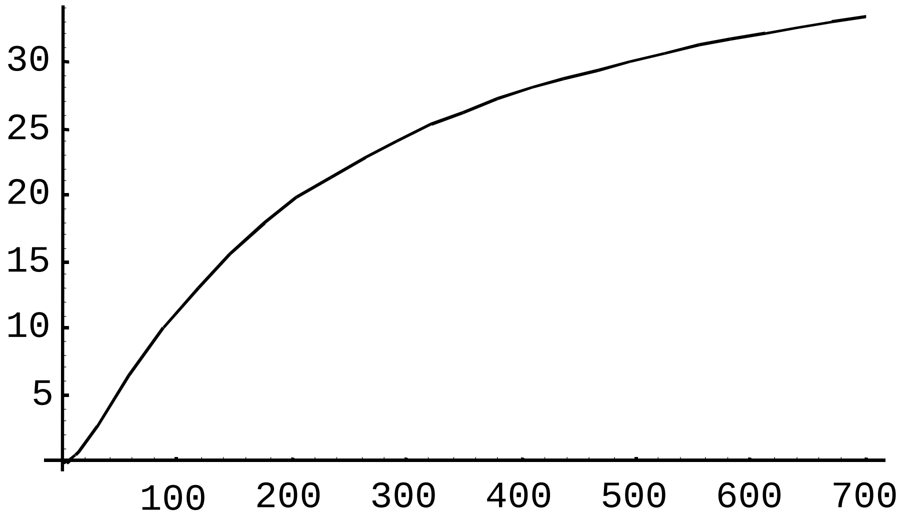
Since everything is constant in each period half of the population receive a monetary income given by (8), with $W_i$ distributed according to a Pareto distribution, and half of the population receive the equivalent income divided by $(1+\pi)$. Once more, measured inequality is given by a the Gini index of a population composed for one half of income distributed according to a Pareto, and for the other half of income distributed according to the same distribution after a proportional re-basement by a factor $(1+\pi)$. The re-basement is clearly a function of the perfectly anticipated level of inflation.

Chart 2 shows the effect of perfectly anticipated inflation on the Gini index with staggered nominal contracts. The sharp increase in inequality as inflation increases to very high rates is only a statistical feature. Permanent incomes are in fact the same for all workers. Only nominal income differs because contracts are renewed only partially each year.

In chart 2 it is possible to see that, under these assumptions, the measure of inequality increases substantially, as inflation becomes very high. Already with inflation rates of 300% on a yearly base, high but not infrequently observed in practise, the Gini index passes from 0 to more than 25%. The question, however, is whether this matters at all, i.e., whether a government facing such a sharp increase in the measure of inequality should intervene. The answer is negative since the increase in inequality is simply a statistical feature. Two more measures could be used to determine the necessity of intervention. One is a measure of social mobility. In this case it would show a very high level of mobility within the society from one period to another (if inflation is high enough). The second is a consumption-based measure of inequality that would simply show no variation at all.

**Chart 2**

**Increase in Inequality (the Gini Index)**
**As a consequence of anticipated inflation with staggered contracts**




**Legend:** Only half of the work force renew contracts every year.

## *3. Empirical issues*

By making use of the tool of equiproportional growth, the previous section showed how the increase in measure inequality might not imply either an increase in social distress (immiserising growth), and might simply be a statistical feature. The problem being that two populations, with well defined income distribution, were in both examples "artificially" combined together to yield an overall measure of inequality.

In the light of these results, the empirical assessment of the growth/inequality and macroeconomic policy/inequality relationships looks problematic. The answer is, of course, to pursue a correct specification of the model.

In table (1) a simple linear model of inequality is estimated using the Gini index, and similar equation are then estimated for 4 of the 5 quintiles of the distribution using SURE estimates (the fifth equation is obviously a linear combination of the others and should be dis-regarded). For reasons that will become immediately apparent the third quintile was not included in the regression. All dependent variables are in simple percentage to allow for comparison.

The results for the coefficients of the explanatory variables show three main patterns. One pattern is characteristic of the lagged dependent variable. The coefficient is not significantly different across equations. The second pattern is shown by variables that affect in opposite ways the upper and lower quintiles. I this second case the coefficient passes from positive to negative or vice versa, increasing or decreasing steadily. The significance of the coefficient in the individual equations is therefore simply a statistical feature, as the significance can only be assessed using an overall measure of the distribution. (In the case of regression for the third quintile, shown as a check in the table but not included in the sure estimates, these coefficients should all be insignificant as they should all in value be near zero). These patterns partake to variables that affect the whole distribution of income and are correctly estimated using summer measure of the distribution.

There is, however, a third pattern that belongs to variables that affect only one part of the distribution (upper or lower quintiles). This pattern is characteristic of variables that influence a specific section of the population. If such variables are identified, the use of simple aggregate measures of the distribution should be dis-regarded and a more structural model should be favoured.

The Gini index or the quintile regressions are not the only way in which the model can be estimated. The use of the real mean income levels for the different sections of the population, used to derive the quintile and Gini indexes, can provide an alternative strategy for estimation. The results are shown in the table 2. It is now possible to estimate, more correctly, the equations in logs. The equation for the Gini index is given as a comparison. The overall results show that un-transformed data do yield in some cases different results and should therefore be preferred.

A final issue is the presence of a strong dynamic in the model. When single equation regression for the Gini index is estimated in place of more correct structural models, the dynamic structure of the model may give rise to biases described by Pesaran at al. 1995.

Again the correct strategy is to better identify the model, using structural equations for different section of the population.

## 4. *Conclusions*

This paper has shown that many of the empirical assessment of the growth inequality and macroeconomic policy inequality relationships may be meaningless and/or incorrect.

If the labour market is characterised by staggered contracts, even perfectly anticipated inflation may have an apparent effect on inequality. Recent works that deny this impact at an empirical level must be based on tests that have a low power. In the same way empirical findings that sustain the hypothesis of a positive relationship between growth and inequality may simply reflect a statistical feature of the model, without having any normative implications. In one of the examples given in this paper growth increased inequality, while living anyone (weakly) better off.

Finally, the empirical assessment of these relationships is in many way problematic, and should be based, as far as possible, on structural model and un-transformed data.

The underlying problem is that the Gini index, or any summary measure of inequality, implicitly treats the population as a *unicum*. If the population is, instead, composed of different sections whose income and within sector inequality depends on specific variables, the assessment of the relationships using single equation aggregate tools are not correct. In this case, only a full structural model of the different sections (if any) of the population can yield results that could provide both reliable estimates and results that could be interpreted theoretically.

*Example a)*

*Pareto distribution and proportionate income growth*

a) $$F_2(y)=\begin{cases}0 & y<\varepsilon\\ 1-\left(\dfrac{\varepsilon}{y}\right)^{\alpha} & y\geq\varepsilon\end{cases}$$

b) $$F_1(y)=\begin{cases}0 & y<\varepsilon\\ 1-\left(\dfrac{k\varepsilon}{y}\right)^{\alpha} & y\geq k\varepsilon\end{cases}$$

c) $$F(y)=\begin{cases}0 & y<\varepsilon\\ (1-q)\left[1-\left(\dfrac{\varepsilon}{y}\right)^{\alpha}\right] & k\varepsilon>y\geq\varepsilon\\ (1-q)\left[1-\left(\dfrac{\varepsilon}{y}\right)^{\alpha}\right]+q\left[1-\left(\dfrac{k\varepsilon}{y}\right)^{\alpha}\right] & y\geq k\varepsilon\end{cases}$$

d) $$\mu_2=\frac{\alpha\varepsilon}{\alpha-1}$$

e) $$\mu_1=k\mu_2=\frac{\alpha k\varepsilon}{\alpha-1}$$

f) $$\mu=q\mu_1+(1-q)\mu_2=[qk+(1-q)]\mu_2=\frac{\alpha\varepsilon}{\alpha-1}[qk+(1-q)]$$

g) $$L_1(p)=L_2(p)=1-(1-p)^{\frac{(\alpha-1)}{\alpha}}$$

h) $$g_1=g_2=\frac{1}{2\alpha-1}$$

i) $$\frac{\partial G(q)}{\partial q}=-\frac{2}{\mu}\left\{(\mu_1-\mu_2)\frac{1}{2}[1+G(q)]+(g+1)\left((1-q)\mu_2-q\mu_1-(1-2q)\frac{1}{k^{\alpha}}\mu_1\right)-(1-2q)\left(1-\frac{1}{k^{\alpha}}\right)\mu_1\right\}$$

j) $$\frac{\partial G(q)}{\partial q}=-\frac{2}{[kq+(1-q)]}\left\{\frac{(k-1)}{2}[1+G(q)]+\frac{2\alpha}{2\alpha-1}\left((1-q)-qk-\frac{(1-2q)}{k^{\alpha}}k\right)-(1-2q)\left(1-\frac{1}{k^{\alpha}}\right)k\right\}$$

*Bibliography*


Adelman, Irma and Cynthia Taft Morris (1973) *Economic Growth and Social Equity in Developing Countries*, Stanford: Stanford University Press.

Adelman, Irma and Sherman Robinson (1988) "Income distribution and development" in Chenery, H., and T.N. Srinivasan (eds.) *Handbook of Development Economics*: Volume 1, Rotterdam: North Holland.

Ahluwalia, Montek S. (1976) "Income distribution and development: some stylized facts," *American Economic Review Papers and Proceedings* 66: 128-135.

Alesina, Alberto and Allan Drazen. (1991) "Why are stabilizations delayed?" *American Economic Review*, 81: 1170-1188.

Alesina, Alberto and Roberto Perotti. (1993) "Income distribution, political instability, and investment", NBER Working Paper. Series No. 4486. Cambridge, MA: National Bureau of Economic Research.

Alesina, Alberto and Dani Rodrik (1994) "Distributive politics and economic growth", *Quarterly Journal of Economics* 108: 465-90.

Anand, Sudhir and S.M. Ravi Kanbur (1993) "The Kuznets Process and the Inequality-Development Relationship", *Journal of Development Economics* 40:25-52.

Anand, Sudhir, and Martin Ravallion (1993) "Human development in poor countries: On the role of private incomes and public services", *Journal of Economic Perspectives*, 7: 133-150.

Banerjee, Abhijit V., and Andrew F. Newman (1993) "Occupational choice and the process of development", *Journal of Political Economy* 101:274-99.

Bencivenga, Valerie and Bruce Smith (1991) "Financial Intermediation and Endogenous Growth", *Review of Economic Studies*. 58: 195-209.

Bidani, Benu and Martin Ravallion (1995) "Decomposing social indicators using distributional data", *Journal of Econometrics*, forthcoming.

Bourguignon, Fran‡ois and C. Morrison (1990) "Income distribution, development and foreign trade: A cross-sectional analysis.' *European Economic Review*. 34: 1113-1132.

Brainard, S. Lael and Thierry Verdier (1994) "Lobbying and adjustment in declining industries.' *European Economic Review* 38: 586-595.

Bruno, Michael and William Easterly (1995) "Inflation crises and long-run growth", mimeo, World Bank, Washington DC.

Bruno, Michael, Martin Ravallion and Lyn Squire (1996) 'Equity and Growth in Developing Countries:Old and New Perspectives on the Policy Issue', The World Bank Policy Research Working Papers n.1563.

Bulir, Ales (1998) 'Income Inequality: Does Inflation Matter?', IMF working papers n.7/98.

Chatterjee, S. (1991) "The effect of transitional dynamics on the distribution of wealth in a neoclassical capital accumulation model", Federal Reserve Bank of Philadelphia, Working Paper.

Chen, Shaohua, Gaurav Datt, and Martin Ravallion (1994) "Is poverty increasing or decreasing in the developing world?' *Review of Income and Wealth*, 40: 359-376.

Chenery, H., M. Ahluwalia, C. Bell, J. Duloy and R. Jolly (1974) *Redistribution with Growth*, Oxford: Oxford University Press.

Clarke, George R.G. (1993) "More evidence on income distribution and growth", mimeo, Department of Economics, University of Rochester.

Datt, Gaurav (1995) "Poverty in India: 1951-1991", mimeo, Policy Research Department, World Bank.

Datt, Gaurav and Martin Ravallion (1992) "Growth and redistribution components of changes in poverty measures: a decomposition with applications to Brazil and India in the 1980s", *Journal of Development Economics* 38: 275-295.

Deininger, Klaus and Lyn Squire (1996) 'A New Data Set Measuring Income Inequality' *The World Bank Economic Review* 10:565-91.

Deininger, Klaus and Lyn Squire (1995) "Income distribution and development", mimeo, Policy Research Department, World Bank.

Deininger, Klaus, Lyn Squire and Tao Zhang (1995) "A new data base on international income distribution", mimeo, Policy Research Department, World Bank.

Demery, Lionel and Lyn Squire (1995) "Poverty in Africa: An emerging picture", mimeo, World Bank, Washington, DC.

Dorosh, Paul A., and David E. Sahn (1993) "A general equilibrium analysis of the effect of macroeconomic adjustment on poverty in Africa", mimeo, Cornell University Food and Nutrition Policy Program.

Eckstein, Zvi and Itzhak Zilcha (1994) "The effects of compulsory schooling on growth income distribution and welfare.' *Journal of Public Economics* 54:339-359.

Favaro, Edgardo and Donna MacIsaac (1995) "Who benefited from Peru's reform program? Poverty note", mimeo, Latin America 3 Country Department, World Bank, Washington, DC.

Fields, Gary (1989) "Changes in Poverty and Inequality in Developing Countries", *World Bank Research Observer*, 4:167-186.

____________ (1994) "Data for measuring poverty and inequality changes in the developing countries", *Journal of Development Economics* 44: 87-102.

Fishlow, Albert (1995) "Inequality, poverty and growth: Where do we stand?", Paper presented to the World Bank's Annual Conference on Development Economics.

Foster, James., J. Greer, and E. Thorbecke (1984) "A class of decomposable poverty measures", *Econometrica* 52:761-765.

Galor, Oded and Joseph Zeira (1993) "Income distribution and macroeconomics' *Review of Economic Studies* 60: 35-52.

Glewwe, Paul and Gillette Hall (1994) "'Poverty, inequality, and living standards during unorthodox adjustment: The case of Peru", *Economic Development and Cultural Change* 42: 689-717.

Hoff, Karla (1993) "The second theorem of the second best", STICERD Working Paper, London School of Economics *(Journal of Public Economics*, forthcoming).

Hoff, Karla and Andrew B. Lyon (1994) "Non-Leaky Buckets: Optimal Redistributive Taxation and Agency Costs.' NBER Working Paper Series No. 4652. Cambridge, MA: National Bureau of Economic Research.

Jung, Jin Hwa (1992) "Personal income distribution in Korea, 1962-1986: A Human Capital Approach", *Journal of Asian Economics* 3: 57-72.

Kakwani, Nanak (1987) "Inequality of income derived from survey data during the inflationary period", *Economics Letters* 23: 387-388.

Kuznets, Simon (1955) "Economic growth and income inequality", *American Economic Review* 45:1-28.

______________ (1966) *Modern Economic Growth*, New Haven: Yale University Press.

Lambert, Peter J. (1993) *The Distribution and Redistribution of Income: a Mathematical Analysis*, Manchester University Press, 2nd edition.

Li, Hongyi, Lyn Squire and Heng-fu Zou (1995) "Income inequality, human capital accumulation and political economy", mimeo.

Lipton, Michael and Martin Ravallion (1995) "Poverty and policy.' In Jere Behrman and T.N. Srinivasan (eds) *Handbook of Development Economics* Volume 3 Amsterdam: North-Holland.

Milanovic, Branko (1995) "Poverty, inequality and social policy in transition economies", Transition Economics Division, Research Paper 9, Washington,DC, The World Bank.

Morley, Samuel A. (1994) "Poverty and inequality in Latin America: Past evidence, future prospects", Policy Essay 13. Overseas Development Council, Washington DC.

Oshima, H. (1970) "Income inequality and economic growth: The post-war experience of Asian countries", *Malayan Economic Review*, 15: 7-41.

zler, S. and G. Tabellini (1991) "External debt and political instability' NBER Working Paper No. 3772. Cambridge, MA: National Bureau of Economic Research.

Papanek, Gustav and Oldrich Kyn (1986) "The effect on income distribution of development, the growth rate and economic strategy", *Journal of Development Economics*, 23:55-65.

Persson, Torsten and Guido Tabellini (1994) "Is inequality harmful for growth?' *American Economic Review* 84: 600-621.

Pesaran, Hashem M. and Ron Smith (1995) 'Estimating long-run relationships from dynamic heterogeneous panels', *Journal of Econometrics*, 68:79-113.

Ram, Rati (1995) "Economic development and inequality: An overlooked regression constraint", *Economic Development and Cultural Change*, 3:425-434.

Ravallion, Martin (1995a) "Growth and poverty: evidence for the developing world", *Economics Letters*, 48:411-417.

____________ (1995b) "On Rati Ram's test of the Kuznets hypothesis", mimeo, World Bank, Washington DC.

Ravallion, Martin and Shaoua Chen (1997) "What can Survey Data Tell Us about Recent Changes in Distribution and Poverty?" *The World Bank Economic Review* 11:357-82.

Ravallion, Martin and Gaurav Datt (1995). "How important to India's poor is the sectoral composition of growth?", *World Bank Economic Review*, forthcoming.

Ravallion, Martin and Monika Huppi (1991) "Measuring changes in poverty: a methodological case study of Indonesia during an adjustment period", *World Bank Economic Review* 5:57-84.

Ribe, Helena, S. Carvalho, R. Liebenthal, P. Nicholas, and E. Zuckerman (1990) "How adjustment programs can help the poor", World Bank Discussion Paper 71, World Bank, Washington, DC.

Robinson, Sherman (1976) "A note on the U-hypothesis relating income inequality and economic development", *American Economic Review* 66:437-440.

Saint-Paul, Gilles and Thierry Verdier (1992) "Historical accidents and the persistence of distributional conflicts", Journal of the Japanese and International Economies 6: pp. 406-422.

Sarel, Michael (1997) "How Macroeconomic Factors Affect Income Distribution: The Cross-Country Evidence", IMF working papers n.152/97.

Selowsky, Marcelo (1991) "Protecting nutrition status in adjustment programs: recent World Bank activities and projects in Latin America", Food and Nutrition Bulletin 13:293-302.

Sen, Amartya (1992*) Inequality Re-Examined.* Oxford: Oxford University Press.

Squire, Lyn (1993) "Fighting Poverty", *American Economic Review* 83(2): 377-382.

Thorbecke, Erik (1991) "Adjustment, growth and income distribution in Indonesia", *World Development* 19:1595-1614.

Tsiddon, Daniel (1992) "A moral hazard trap to growth", *International Economic Review*, 33: 299-321.

Vanhoudt, Patrick (1997) "Do Labour Market Policies and Growth Fundamentals Matter for Income Inequality in OECD Countries? Some Empirical Evidence", IMF working papers n.3/97.

Watkins, Kevin (1995) The OXFAM Poverty Report. Oxford: OXFAM.

World Bank (1990) World Development Report. New York: Oxford University Press.

__________ (1991) Assistance Strategies to Reduce Poverty. A World Bank Policy Paper, The World Bank, Washington DC.

__________ (1993) The East Asian Miracle, New York: Oxford University Press.

**Table 1**
**SURE Estimates for the Whole Sample**

| | GINI | | Q1 | | Q2 | | Q3 | | Q4 | | Q5 | | TOP5% | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Coeff | SL | Coeff | SL | Coeff | SL | Coeff | SL | Coeff | SL | Coeff | SL | Coeff | SL |
| **Constant** | -23.70 | 0.49 | 1.11 | 0.86 | 17.72 | 0.02 | 33.95 | 0.00 | 42.38 | 0.00 | -31.41 | 0.22 | -63.62 | 0.06 |
| **Y{1}** | 0.23 | 0.17 | 0.23 | 0.00 | 0.28 | 0.00 | 0.38 | 0.00 | 0.32 | 0.00 | 0.34 | 0.00 | 0.20 | 0.27 |
| **MC** | 0.43 | 0.19 | 0.04 | 0.49 | -0.07 | 0.36 | -0.21 | 0.02 | -0.24 | 0.01 | 0.50 | 0.04 | 0.67 | 0.04 |
| **INFPC** | -0.13 | 0.05 | 0.05 | 0.00 | 0.04 | 0.01 | 0.02 | 0.20 | 0.01 | 0.40 | -0.12 | 0.01 | -0.12 | 0.07 |
| **UNRATE** | 0.40 | 0.03 | -0.04 | 0.20 | -0.08 | 0.06 | -0.09 | 0.07 | -0.02 | 0.74 | 0.25 | 0.06 | 0.14 | 0.45 |
| **RIR** | -0.12 | 0.04 | 0.00 | 0.74 | 0.02 | 0.07 | 0.04 | 0.01 | 0.05 | 0.00 | -0.12 | 0.01 | -0.18 | 0.00 |
| **EXGDP** | 0.23 | 0.18 | -0.03 | 0.34 | -0.05 | 0.17 | -0.04 | 0.36 | -0.06 | 0.19 | 0.17 | 0.17 | 0.26 | 0.17 |
| **EMRATIO** | 0.23 | 0.22 | -0.06 | 0.08 | -0.07 | 0.12 | -0.07 | 0.18 | -0.06 | 0.21 | 0.25 | 0.07 | 0.26 | 0.16 |
| **MANEMP** | -0.03 | 0.87 | 0.03 | 0.33 | 0.07 | 0.10 | 0.01 | 0.84 | -0.02 | 0.62 | -0.07 | 0.60 | 0.03 | 0.87 |
| **SERVEMP** | 0.47 | 0.14 | 0.00 | 0.98 | -0.05 | 0.47 | -0.18 | 0.02 | -0.20 | 0.01 | 0.43 | 0.05 | 0.68 | 0.03 |
| **GOVEMP** | -0.57 | 0.07 | 0.09 | 0.10 | 0.04 | 0.54 | 0.12 | 0.11 | 0.11 | 0.17 | -0.35 | 0.11 | -0.41 | 0.17 |
| **GDPPC{1}** | -69.46 | 0.82 | 32.94 | 0.55 | 10.21 | 0.88 | 27.62 | 0.73 | 61.04 | 0.45 | -103.14 | 0.65 | -268.55 | 0.37 |
| **INVRATE** | 26.18 | 0.05 | 3.79 | 0.10 | -6.39 | 0.03 | -9.22 | 0.01 | -9.72 | 0.00 | 21.16 | 0.03 | 28.13 | 0.03 |
| **POPGR** | -0.38 | 0.16 | -0.03 | 0.51 | 0.04 | 0.49 | 0.14 | 0.05 | 0.08 | 0.25 | -0.23 | 0.27 | -0.46 | 0.09 |
| | R**2 | 0.96 | R**2 | 0.96 | R**2 | 0.98 | R**2 | 0.95 | R**2 | 0.86 | R**2 | 0.96 | R**2 | 0.92 |
| | DW | 1.85 | DW | 1.78 | DW | 1.68 | DW | 1.86 | DW | 2.09 | DW | 1.96 | DW | 2.29 |
| | Q | 7.42 | Q | | Q | | Q | | Q | | Q | | Q | 8.45 |
| | SSR | 8.20 | SSR | 0.38 | SSR | 0.61 | SSR | 0.86 | SSR | 0.85 | SSR | 6.67 | SSR | 7.99 |

**Table 2**
**Estimates for Mean Income**

| | MITOT | | MIQ1 | | MIQ2 | | MIQ3 | | MIQ4 | | MIQ5 | | MITOP5% | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Coeff | SL | Coeff | SL | Coeff | SL | Coeff | SL | Coeff | SL | Coeff | SL | Coeff | SL |
| **Constant** | -21049.7 | 0.61 | -13502.4 | 0.47 | -36358.7 | 0.25 | -62533.8 | 0.12 | -57597.7 | 0.26 | -376509.7 | 0.07 | 418853.9 | 0.71 |
| **Y{1}** | 0.5 | 0.00 | 0.3 | 0.00 | 0.5 | 0.00 | 0.6 | 0.00 | 0.6 | 0.00 | 0.2 | 0.26 | 0.6 | 0.00 |
| **MC** | 112.3 | 0.78 | 98.4 | 0.42 | 83.3 | 0.68 | 44.5 | 0.86 | -38.4 | 0.91 | 3138.1 | 0.02 | -8539.7 | 0.43 |
| **INFPC** | -222.5 | 0.01 | 17.4 | 0.62 | -167.1 | 0.00 | -287.6 | 0.00 | -356.8 | 0.00 | -809.3 | 0.05 | -2802.5 | 0.21 |
| **UNRATE** | -286.8 | 0.21 | -267.8 | 0.04 | -187.3 | 0.41 | 64.5 | 0.83 | 80.2 | 0.83 | 140.0 | 0.93 | -998.6 | 0.87 |
| **RIR** | -2.5 | 0.97 | 48.1 | 0.09 | 95.9 | 0.04 | 61.7 | 0.30 | 49.1 | 0.53 | -291.4 | 0.37 | -2357.0 | 0.23 |
| **EXGDP** | -475.6 | 0.02 | -112.1 | 0.36 | -158.5 | 0.43 | -161.6 | 0.54 | -363.3 | 0.28 | -204.9 | 0.88 | -2698.2 | 0.63 |
| **EMRATIO** | 209.1 | 0.36 | 141.0 | 0.34 | 568.4 | 0.02 | 1063.7 | 0.00 | 1086.7 | 0.01 | 1814.1 | 0.28 | -744.0 | 0.91 |
| **MANEMP** | -316.5 | 0.24 | -282.0 | 0.02 | -295.2 | 0.17 | -327.8 | 0.27 | -396.5 | 0.33 | -1269.3 | 0.46 | 7089.7 | 0.25 |
| **SERVEMP** | 89.5 | 0.80 | -158.2 | 0.32 | -399.1 | 0.12 | -425.1 | 0.21 | -350.9 | 0.42 | 1575.1 | 0.35 | 1173.7 | 0.90 |
| **GOVEMP** | 1132.1 | 0.01 | 1033.0 | 0.00 | 1623.4 | 0.00 | 2050.3 | 0.00 | 2257.2 | 0.00 | 2617.8 | 0.22 | 7803.8 | 0.44 |
| **GDPPC{1}** | 398576.6 | 0.36 | 3447.0 | 0.98 | 116093.8 | 0.58 | -146799.3 | 0.59 | -17017.9 | 0.96 | 1676431.9 | 0.23 | 4054570.7 | 0.69 |
| **INVRATE** | 47203.6 | 0.00 | 9579.6 | 0.03 | 8905.5 | 0.22 | 23592.9 | 0.01 | 40854.1 | 0.00 | 174756.1 | 0.00 | 429816.6 | 0.32 |
| **POPGR** | -103.3 | 0.77 | -1658.6 | 0.00 | -2787.3 | 0.00 | -3604.0 | 0.00 | -3759.7 | 0.00 | -5270.6 | 0.17 | -956.1 | 0.92 |
| | R**2 | 1.00 | R**2 | 0.95 | R**2 | 0.94 | R**2 | 0.98 | R**2 | 0.99 | R**2 | 0.99 | R**2 | 0.97 |
| | DW | 2.05 | DW | 2.54 | DW | 2.51 | DW | 2.31 | DW | 2.65 | DW | 2.40 | DW | 2.03 |
| | Q | 12.64 | Q | | Q | | Q | | Q | | Q | | Q | 3.58 |
| | 11753470.91 | SSR | 529166.8323 | SSR | 1416557.501 | SSR | 2362206.403 | SSR | 3763969.209 | SSR | 62901158.98 | SSR | 9391596362 | SSR |

ELENCO DEI WORKING PAPER PUBBLICATI

1. GIAN PAOLO CESARETTI, ANGELA C. MARIANI, SALVATORE VINCI
*Verso una nuova politica per l'agricoltura nell'Unione Europea: un percorso in bilico tra protezionismo e libero scambio*
Aprile, 1996

2. CONCETTO PAOLO VINCI
*Disoccupazione in un modello economico bisettoriale*
Aprile, 1996

3. ANGELA C. MARIANI, VALERIA SODANO
*Innovazione e industria alimentare*
Maggio, 1996

4. CONCETTO PAOLO VINCI
*Disoccupazione, insider-outsider in un modello a due settori*
Maggio, 1996

5. GIUSEPPE MAROTTA, GIOVANNI QUARANTA
*L'applicazione in Italia delle politiche strutturali*
Giugno, 1996

6. ELENA VIGANÒ, LAURA VIGANÒ
*La competitività dell'agricoltura italiana: problemi e potenzialità*
Giugno, 1996

7. ANTONELLA VASTOLA
*La qualità nel sistema agroalimentare: uno schema teorico di analisi*
Giugno, 1997

8. DANIELA COVINO
*Distribuzione alimentare: l'evoluzione del settore e le implicazioni per il sistema agroalimentare*
Gennaio, 1998

9. STEFANIA P.S. ROSSI
*Internalization of Trade in Services and the Interest of the Countries. New Opportunities and Challenges for Senegal*
Marzo, 1998

10. VANIA SENA
*L'analisi econometrica dell'efficienza tecnica. Un'applicazione agli ospedali italiani di zona*
Aprile, 1998

11. MARIA ROSARIA CARILLO, CONCETTO PAOLO VINCI
*Social Increasing Returns and Immigration*
Giugno, 1998

12. ANTONIO GAROFALO, CONCETTO PAOLO VINCI
*Worksharing in a labour market perspective with effort and minimum wages*
Dicembre, 1998

1.99 ANTONIO GAROFALO, CONCETTO PAOLO VINCI
*Orario di lavoro e occupazione in un contesto economico bisettoriale*
Marzo, 1999

2.99 RITA DE SIANO, MARCELLA D'UVA, GIOVANNA MESSINA
*Aree monetarie ottimali: Literature review*
Aprile, 1999

3.99 MASSIMO GIANNINI
*Accumulation and Distribution of Human Capital: The Interaction Between Individual and Aggregate Variables*
Aprile, 1999

4.99 L. CAVALLO – STEFANIA P.S. ROSSI
*Do environmental variables affect the performance and technical efficiency of the European banking systems? A parametric analysis using the Stochastic Frontier Approach*
Giugno, 1999

1.00 MARIA ROSARIA CARILLO
*The Effect of Professionalisation and the Demand for Social Status on the Adoption of New Technologies*
Febbraio, 2000

2.00 BRUNO CHIARINI – PAOLO PISELLI
*Aggregate fluctuations in a unionized labor market*
Marzo, 2000

3.00 RICCARDO FIORITO
*Government Debt, Taxes and Growth*
Marzo, 2000

4.00 ANTONIO GAROFALO - CONCETTO PAOLO VINCI
*Employment, Capital Operating Time and Efficiency Wages Hypothesis: Is There Any Room for Worksharing?*
May, 2000

5.00 BRUNO CHIARINI – MASSIMO GIANNINI
*Employment, Capital Operating Time and Efficiency Wages Hypothesis: Is There Any Room for Worksharing?*
May, 2000

6.00 RITA DE SIANO
*Financial variables as leading indicators: an application to the G7 countries*
June, 2000

7.00 A. GAROFALO - R. PLASMAN - C.P. VINCI
*Reducing Working Time in an Efficiency Wage Economy with a Dual Labour Market*
July, 2000

8.00 MARIA ROSARIA CARILLO
*Scelta Educativa, Status Sociale e Crescita*
Luglio, 2000

9.00 MARIA ROSARIA CARILLO - ALBERTO ZAZZARO
*Professionalizzazione, Status Sociale e Crescita*
Luglio, 2000

Editing e stampa
a cura della
Liaprint Service s.a.s.
Pozzuoli (NA)
tel. e fax 081 526 79 05

FINITO DI STAMPARE NEL LUGLIO 2000